



THE MINERALOGICAL SOCIETY OF NEW SOUTH WALES INC

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NEWSLETTER JUNE 2020

Whilst government restrictions against the COVID-19 pandemic are being relaxed the Society June General Meeting can still only be held in virtual mode. It is to be hoped that by July and certainly by August the restrictions will have been relaxed further and that the Parramatta and Holroyd Lapidary Club can be re-opened and 'live' meetings resumed on its premises.

**The June Meeting will be held by virtual mode on Friday the 12th of June at 7.30 pm
the second Friday of this month, after the long weekend.**

The program at the June Meeting will include a lecture to be given by Murray Brooker on
'Salt Lake Mineral Exploration'.

The Internet link for the June virtual meeting is as follows but John Chapman will also send individual notices by e-mail to all members nearer to the Meeting date.

MInSoc June monthly meeting: Time: Jun 12, 2020 07:30 PM Canberra, Melbourne, Sydney
<https://us02web.zoom.us/j/85463521096>

General Meetings held electronically have been an unfamiliar development for most Society members but the capability of connecting in to a meeting has proved fairly easy for many to master and attendance at the virtual meetings has been very encouraging. Almost forty members 'attended' the April Meeting and over fifty in May and hopefully this number will increase as more people become familiar with the methodology. The virtual meetings are kept to not more than about one and a half hours duration since it has been recommended that this would be the more generally comfortable period for most people to spend in front of their computer screens.

Members hoping to connect in to the next virtual meeting who have not attended the previous ones should have downloaded the 'Zoom' program from the Internet and anyone unsure of the connecting process can ask for phone support from Graham Ogle, John Chapman, Dieter Mylius or Ed Zbik. (Telephone numbers provided with the Committee member's list following).

FORTHCOMING MEETINGS AND PROGRAMS

July 3rd: Dr Garry Lowder will give a lecture introducing his autobiographical book:- **A Journey Through the Elements: Memoirs of a Fortunate Geologist**'. The 'Elements' referred to are Earth, Air, Fire and Water.

August 7th : The **Society A.G.M.** will be followed by the Mayne-Walker Memorial Lecture which will be given by Joanna Parr, research scientist of the CSIRO, on ‘**Seafloor Hydrothermal Mineralisation – The Where, Why, What and How of Mineral Formation at Seafloor Hydrothermal Vents**’.

The September 4th, October 9th (second Friday), and November 6th programs are not yet finalised.

The **43rd Joint Mineralogical Societies Seminar** which was scheduled to be held over the October 3rd to 5th long weekend has been cancelled. The Seminar will be held one year later over the long weekend in October 2021 on the original theme of ‘**43 Shades of Silver**’ in Sydney at the **Ryde-Eastwood Leagues Club**.

December 4th: **Society Annual Christmas Social and Swap n’ Sell**. Holding the Social will depend on whether the virus restrictions have been completely lifted by then.

The SOCIETY COMMITTEE

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Members please note: Ed Zbik’s land-line phone is currently offline and his e-mail has been changed

"ELSMORE HISTORY"

Brian Holden has asked that the following request for information should be circulated to members. Anyone with any of the information described may contact him or Brian England.

"Currently researching and collecting information on the formation, history and operation of Australia's oldest commercial tin mine at Elsmore, NSW.

Any documents, maps, photographs or anecdotal info of the area you would like to share would be most appreciated"

My contact :- *brianholden052@gmail.com* and *brian.england@bigpond.com.au*

The MAY Virtual General Meeting

The May Meeting was opened by the Society President, Dieter Mylius, who welcomed those members who had connected in to the virtual program. Attendees were advised that Graham Ogle who was running the master Zoom program would keep most people muted whilst one person was speaking but if anyone wished to ask a question they could use a 'CHAT' facility in the program, the icon for which would be on the toolbar at the bottom of their screens. The question could then be typed and sent either to the controller who could 'unmute' the person to pose the query or comment or the message could be sent to any other individual attendee.

There were a few announcements: Graham Ogle reported that there would be a virtual **Micro-Mineral Group meeting** at 1.00pm on Saturday the 9th. He would send out an e-mail providing the link to the members usually joining the Micro-mount meetings and invited anyone else to let him know if they also wanted to attend when he would add them to the list. There would be a general discussion about aspects of Mindat and a number of mineral images would be displayed for further discussion.

Dieter Mylius reported that all the other state mineralogical societies and the New Zealand Micro-Mineral Group had been contacted about the proposal to **postpone the 2020 Seminar** to which they had all agreed. The Seminar would be held over the originally-intended period of the first weekend in **October** but in **2021** and on the original theme of '**43 Shades of Silver**'. The postponement would remain even if the pandemic restrictions were completely cleared before October since re-commencing arrangements after the several-months disruption would be too difficult to organise. All the others societies would re-schedule their Seminars to move on one year.

It had been decided that the Society should hold a **Virtual Seminar in October** this year, possibly in two sessions on Saturday and Sunday the 3rd and 4th of October. There would be two sessions rather than one which would be tiring for attendees to watch their computer screens for too long. The sessions would probably start about 10.00 or 11.00am with a lunch break. The later morning starting time would ideally accommodate attendees in WA whose time zone was two hours behind Sydney and in New Zealand which was two hours ahead. The program during the virtual sessions would include lectures or talks by speakers invited from the other states and who could provide entertaining talks on subjects of their choice.

Graham Ogle announced that some time ago ex-Society member Simon Knight had given him a quantity of specimens from the Broken Hill mine but the one in Zambia, not NSW. The specimens were currently stored in his garage and presented a varied mixture corresponding to Broken Hill NSW main-line-of-lode meet Reaphook Hill in SA with scholzites and other minerals. The collection was interesting and Graham Ogle could probably provide a mini-talk on the specimens in due course. (The Zambian mine is also a lead-zinc-silver deposit. The name of the town was changed to Kabwe after the country gained independence in 1966).

Talking about mineral collections in storage, Brian Holden invited anyone to help him get into his garage where there was a cabinet with specimens stored which had not seen daylight since 1968. He suggested that this could be a re-discovery session one day.

Lee Spencer reported that he had received a box of material from Georgetown in Queensland in which he had identified up to thirty secondary minerals. Ian Graham was currently preparing a paper on the secondary minerals of Georgetown which should prove to be very interesting.

John Chapman reported on the current situation in regard to establishing 'mudgeeite' as a new mineral by the Commission on New Minerals and Mineral Names, (CNMMN), of the International Mineralogical Association, (IMA). An application had previously been made to the Commission but failed

by one vote to be accepted. Society members had been working on refining the information on the mineral and making another application which was to be re-submitted soon. He was fairly confident that it would be accepted this time.

Paul Moxon reported that during a trip to Sydney he had stopped at a railway cutting at Mt Thorley, just before Singleton on the Putty road, and collected up a bag-full of glendonites, small pine-apple forms and some associated with fossils. A field trip to the site was a possibility, subject to permission being obtained.

Referring to more material stored in garages Dieter Mylius advised that some years ago the Society had found that Western Sydney University intended to discard of an amount of specimen material stored in the north Parramatta campus building and managed to rescue a number of boxes. He had been storing some of these and in recently looking at the material had noted that there were quantities of specimens from strange sites in Queensland that he had never visited. The material represented a subject for research and mineral identification.

‘An Item of Interest’:

John Chapman had prepared a small quiz during which he displayed images of a number of items and asked a question or made a statement about each one. Members were then invited to signify agreement or disagreement with the statement or answer by accessing a reaction icon on the toolbar at the bottom of their computer screens. After the questions and answers John Chapman explained some of the geological or mineralogical features or processes which had formed the item displayed.

With no more announcements to be made or items of interest to be presented Dieter Mylius proceeded to deliver his scheduled lecture describing a project which he had been conducting at the Australia Museum to thoroughly examine a large number of specimens of bismuth minerals in the museum collection. The lecture was illustrated with a large number of images of the specimens which unfortunately as the speaker admitted, were not “high achievers in the looks department”.

The specimens all had old labels, also illustrated, with the source location and presumed mineral identity given but the intention was to confirm the identity and establish whether there were other minerals present and identify them also. The study showed that whilst many specimens were labelled correctly there was quite a ‘hidden collection’ among the samples with a significant number of other minor and sometimes rare constituent minerals identified.

The following text and images illustrating his lecture was provided by the speaker.

Secondary Bismuth Minerals in the Collection of the Australian Museum

Dieter Mylius

‘I have the privilege of being a volunteer at the Australian Museum in the Geoscience section headed by Ross Pogson. The Australian Museum has many thousands of mineral specimens, many acquired well over 100 years ago, just waiting for someone to study them. To quote Ross, “we usually accept what we are told when acquiring the specimen, unless we suspect otherwise, and time does not allow testing of every single specimen, but very often the collector or donor doesn’t know or suspect everything that is in the specimen either.”

My original task was to check that all the specimens labelled as ferrimolybdate, $(\text{Fe}_2^{3+}(\text{Mo}^{6+}\text{O}_4)_3 \cdot 8\text{H}_2\text{O})$ were in fact ferrimolybdate. This was to be done using powder x-ray diffraction

(XRD). Most were ferrimolybdite. However, koechlinite (Bi_2MoO_6) often popped up (especially in Kingsgate and other deposits where bismuth also occurred), so the testing naturally progressed to the secondary bismuth minerals.

Many specimens had been in the collection for many decades and identification at the time may have been 'Bismuth oxides', 'bismuth carbonate', or 'bismite'. Many secondary bismuth minerals look remarkably similar to each other, or like the clay or weathered mica you or I would scrub off to see what more desirable minerals may lurk underneath. Many of the specimens you would probably not even pick up. Here we must thank the past generations for preserving what they thought was interesting and making it available to the museum.

I have X-rayed 150 specimens, doing between 1 and 6 separate X-rays on each and I am sorry, but unlike ferrimolybdite, none of these minerals are high achievers in the looks department.



Bismuth, Deepwater, NSW

Bismuth, Bi, atomic number 83, atomic weight 208.980 has a history of use to treat many illnesses. General cure-alls at the beginning of the 20th century (milk of bismuth), and other bismuth compounds used to treat syphilis. Most of the original studies of Bismuth minerals were done in Europe, notably in the Erzgebirge, Germany in the 1800's and early 1900's. Many species have been known for a long time.

Main uses today are in cosmetics, pigments, remedies for diarrhea, (bismuth subsalicylate) and other pharmaceuticals, low melting point alloys with lead, tin, etc., fire extinguishers, shot, ammunition & fishing sinkers. Generally it is produced in small amounts as a by-product, mainly from China and Mexico.

The dead give-away of Bismuth minerals is their weight if they are solid. Native bismuth has a specific gravity (SG) of 9.7 or 9.8 and bismuthinite (Bi_2S_3) has an SG of about 6.8. Bismutite ($(\text{BiO})_2\text{CO}_3$) is one of the most common Bismuth secondary minerals, and has an SG ranging from 6.7 to 7.4, which is 2.5 to 3 times the specific gravity of clays and micas which are typically 2 to 3. However, if not solid or just coatings on quartz or the host rock, you do not have the advantage of weight to give you a hint

The minerals in this presentation fall into two groups just by their appearance.

a. There are clay-like ochres, oxides, carbonates that are a yellow to cream colour, which many of you may be familiar with.

b. Then there are dark rims and blotches associated with native bismuth. These became increasingly interesting as testing went on.

If nothing else, I hope that this presentation will show that there is more going on in these specimens than may be apparent. These are all Australian Museum specimens. There are many ways to approach presenting the results but for mineral collectors the most useful is probably by locality and we will look at :-

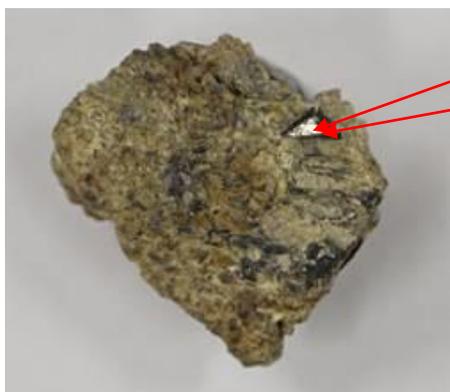
Kingsgate, New England, NSW
Deepwater & Dundee, New England, NSW
Elsmore, New England, NSW
Murrumbateman, near Canberra, NSW
Whipstick near Pambula, NSW
Barrier Ranges & Mt Gipps, western NSW
Halifax Bay, Qld
Biggenden & Mt Shamrock, Qld
Wolfram Camp, Bamford, Chillagoe area, Qld
Torrington area, New England, NSW

[Each location was described in turn with images of typical specimens from the locations displayed and aspects of them with minor constituents pointed out. A few examples will be provided in this summary].

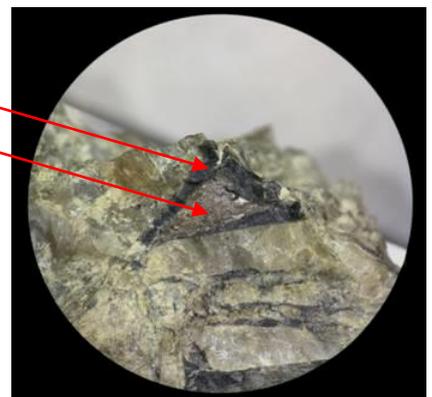
KINGSGATE:

Bismuth oxide D22004. Kingsgate, NSW. Exchanged with George Smith, 13 Feb 1918.

This specimen of bismuth oxide has a euhedral grain of native bismuth surrounded by a dark grey, dull rim. This proved to be bismite (Bi_2O_3) with minor bismutite, ($(\text{BiO})_2\text{CO}_3$) This in itself was unusual as most specimens in this survey originally labelled as bismite, were in fact bismutite.



Bismite
Bismuth



DEEPWATER AREA

Specimen D28507: Bismuth encrusted with Bismutite and Bismite, A.W. Mine, 14 Miles NE of Deepwater, NSW, Purchased from George Smith on 6 January 1928.

The outside of the specimen was nothing to look at, but its weight would have been a giveaway. Once cracked open, fantastic crystallised native bismuth was revealed.



The yellowish material proved to be koechlinite (Bi_2MoO_6) with some bismutite



The dark grey rim around the bismuth proved to be bismite with bismutite

DUNDEE:

Bismuth changing to bismite. D35450. Rare Metals Mine, Dundee, NSW. Presented by George Smith on 17 April 1939.



These pieces of bismuth were found to be coated with bismite, also containing bismutite

ELSMORE, New England area, NSW, is a little different.

Several boxes of pea-sized secondary cream-coloured bismuth "gravel" was variously labelled as bismoclite and bismutite. A random sample of 10 pebbles were tested and all came back as bismoclite (BiOCl), often crusting a water-worn crystal of brown cassiterite. Many of the Bismuth secondary minerals have been found at Elsmore, but the bismoclite is not unusual.

MURRUMBATEMAN is between Canberra and Yass, in NSW and includes claims such as Bullman's, Hay Mair's and MacCheeny's. Several specimens labelled as bismutite were tested, and were mainly bismutite but in places included beyerite ($\text{Ca}(\text{BiO})_2(\text{CO}_3)_2$), again visually indistinguishable from bismutite.

WHIPSTICK: A specimen, D21661, from the Mt Metallic Mine at Whipstick, near Wyndham in southern NSW was labelled as bismite with molybdenite, but proved to be koechlinite (Bi_2MoO_6). Interestingly, much of the matrix included spessartine, the Mn garnet.

There was an indication of the rare mineral atelestite ($\text{Bi}_2(\text{AsO}_4)\text{O}(\text{OH})$), but this would need further work.

MT GIPPS is about 10km E of Broken Hill. This was the station for which Charles Rasp was a boundary rider, when he found some ore at Broken Hill.

MT SHAMROCK is about 15km NW of Biggenden. It was a small gold mine, producing gold and gold tellurides (hessite), but also contained bismuth and molybdenum.

HALIFAX BAY is a broad coastal area north of Townsville in Qld. Possibly referred to mines inland to the N and NW, which may include Wolfram Camp area whose ores were possibly taken to the coast for shipping. Depending on where samples were taken from specimen, bismutite was present, but also bismite and bismoclite. It is also one of the specimens in which an unnamed mineral, bismuth iron oxide ($\text{Bi}_{24}\text{FeO}_{40}$), was found. It is close to bismite with a little Fe present, but with a different XRD pattern.

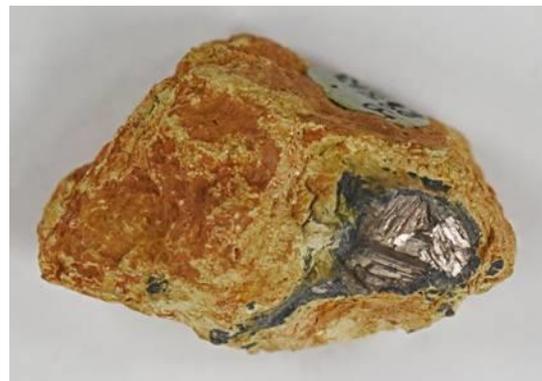
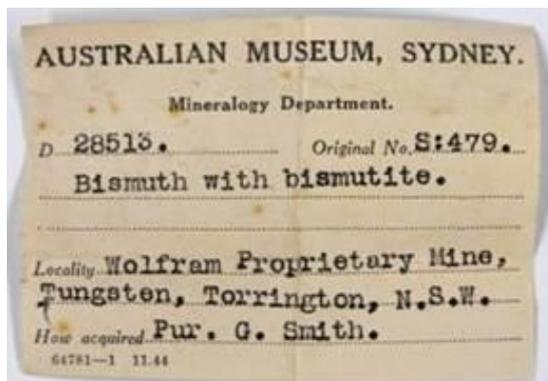
BAMFORD is basically at Petford on the Burke Development Rd between Dimbula (Wolfram Camp) and Almaden, about 140km west of Cairns in Qld. Well and truly in the W, Mo, Bi area, it's the type and only locality for the rare green mineral, Bamfordite ($\text{Fe}^{3+}\text{Mo}_2\text{O}_6(\text{OH})_3 \cdot \text{H}_2\text{O}$).

LINEDALE, CHILLAGOE ? The locality is enigmatic, as I can find no record of it. It appears there was a Linedale syndicate working in the Chillagoe area (Trove, Northern Miner, July 12, 1895), but it focused on copper. It also refers to the Linedale's West Chillagoe company. It may have had an interest in a deposit further east near Dimbula and Wolfram Camp.

WOLFRAM CAMP is well known as a source of fine specimens of molybdenite, bismuth and "wolframite", often quite large in size and well crystallized.

TORRINGTON

Bismuth with bismutite. D28513, Wolfram Proprietary Mine, Tungsten, Torrington, NSW. Purchased from George Smith on 6 Jan 1928.



An earthy, but heavy nodule with a core of native bismuth. D28513 - Torrington - listed as bismutite, was mainly sillénite ($\text{Bi}_{12}\text{SiO}_{20}$) with some bismutite. Sillénite is an uncommon mineral but is represented on every continent. Its type locality is in Durango in Mexico. In Australia it was also recorded at Elsmore by John Rankin, et al. back in 2002.

Several other Torrington specimens were tested

Bismuth oxide and carbonate from the Bismuth Mine at Torrington (D22702) was found to be zavaritskite (BiOF) (dark grey) with bismutite, minor preisingerite and topaz.

Bismutite and bismite from Torrington (D29744 & 29745) was found to be a mixture of russellite (Bi_2WO_6)/koechlinite (Bi_2MoO_6) and bismutite with minor preisingerite. It is sometimes quite difficult to differentiate between russellite and koechlinite based on an XRD pattern.

Bismutite and bismite from Heffernan's Mine in Torrington (D29746) was also found to be russellite/koechlinite and bismutite.

The Rockvale (Wolfram) mine, Tungsten, 5km N of Torrington, E of the Silent Grove Rd, NSW. A rather nondescript specimen from this mine at Tungsten (not to be confused with the Rockvale mine near Armidale) contained several small submetallic, dark grey to black grains within the coarse grained granitic rock. These proved in part to be zavaritskite, BiOF.

Summary of species found, in order of date first described (not necessarily under current name).

There are many bismuth minerals (~240), some of which are very pretty in hand specimen and under the microscope ... but not these.

Bismutite	$(\text{BiO})_2\text{CO}_3$	1805	(Luftsaures Wismuth)
Tellurobismutite	Bi_2Te_3	1815	(Tellur-Wismuth)
Atelesite	$\text{Bi}_2(\text{AsO}_4)\text{O}(\text{OH})$	1832	
Bismuthinite	Bi_2S_3	1880	
Powellite	CaWO_4	1889	
Koehlinite	Bi_2MoO_6	1914	
Bismoclite	BiOCl	<1921	
Beyerite	$\text{Ca}(\text{BiO})_2(\text{CO}_3)_2$	1921	(Bismutosphalerite),
1943			
Russellite	Bi_2WO_6	1938	
Bismite	Bi_2O_3	1943	
Sillénite	$\text{Bi}_{12}\text{SiO}_{20}$	1943	
Rooseveltite	Bi_2AsO_4	1946	
Kettnerite	CaBiCO_3OF	1957?	
Betpakdalite-NaNa	$[\text{Na}_2(\text{H}_2\text{O})_{16}\text{Na}(\text{H}_2\text{O})_6][\text{Mo}_8\text{As}_2\text{Fe}_3\text{O}_{33}(\text{OH})_4]$		2011 (1961)
Zavaritskite	BiOF	1962	
Preisingerite	$\text{Bi}_3(\text{AsO}_4)_2\text{O}(\text{OH})$	1981	
Gananite	BiF_3	1984	
Tetrarooseveltite	Bi_2AsO_4	1994	
Bismuth Iron Oxide	$\text{Bi}_{24}\text{FeO}_{40}$		

Take Home Value

The "hidden collection" is alive and well and probably exists in most collections. You may not be able to identify what you have, but you can put it aside to ask someone. This is especially true if you have a specimen or specimens from places such as Wolfram Camp, Kingsgate, Biggenden and Torrington. Look at them closely to see if there is anything that looks different to what you expect.

Have a look at your native bismuth specimens. On the basis of this study, if there is a dark semi-metallic or dull rim around the outside it may be bismite if Kingsgate, or bismite or zavaritskite if Wolfram Camp, Deepwater or Torrington areas. Most of these minerals are rarely found as crystals, mostly massive or as pseudomorphs. In general, you cannot distinguish between the many cream to yellow coloured Bi secondary minerals by eye or even under the microscope, but bismutite and koehlinite are most common. More often than not, if you have something labelled bismite (Bi oxide) in your collection, chances are it will actually be bismutite (the carbonate).

This study has found tetrarooseveltite for the second time in Australia, namely from a place, or from a company called "Linedale, W Chillagoe". The first was at Elsmore in NSW. The locality of this

second occurrence is not certain. It is also the first recording of gananite (BiF_3) in Australia, namely from the Rockvale Mine near Torrington in NSW, and possibly the second in the world.

Zavaritskite (BiOF) appears to be more common than originally thought. It seems closely associated with native bismuth where the deposits contain fluorine-containing minerals such as fluorite and topaz.

The number of times the name George Smith comes up as the person donating or selling a specimen to the museum is noteworthy. He had an extraordinary eye for fine specimens and things out of the ordinary. It's worth training our eyes for such things when we go out fossicking.

Acknowledgments:

Ross Pogson and the Australian Museum for allowing access to the mineral collection and the XRD for testing. He also provided training in using the machine and interpreting the results, as well as verified many of the results.

Dayna McGeeney at the Australian Museum for accessing and sending out additional information to help prepare this presentation during the current time of lockouts at AM.

John Rankin and David Colchester for additional testing and interpretation of results.

"Bismuth in the Supergene Environment", Timothy D. Murphy, BSc (Hons), UWS published PhD thesis, available online.